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SOURCE: Translation of Asia News Service Photos and Features of Chinese Industry, No. 48, 15 July 1965; No. 64, 15 March 1966.

The photographs described below are obtainable from Graphics Register by CIA photo accession number. The texts are unedited translations of the issues cited above and are on file in the CIA Library. The texts include information on the production and manufacture of 13 models of tractors for agricultural purposes and other types of agricultural machinery including pumps, cultivators and harvestors.

CIA Photo Accession No.:

991535 KUNG-NUNG Model 7 hand tractor being tested by member of the Design Co. of Pei-ching Municipal Electro-Mechanical Industry Bureau. 1964.

1069628 Chang-chou (31 47N 119 48E) Tractor Plant. Model 7 "Worker Peasant" hand tractor. Tractor is suitable for use on vegetable farms, fruit orchards, multi-level fields, also for pumping, hulling, etc.

1062544 Model 7 "Worker Peasant" hand tractor being prepared for shipment. This model is also manufactured in Shang-hai, Wu-han, Shen-yang and Pei-ching.

25X1 1069627 Shang-hai Tractor Plant (31 13N 121 27E) [redacted] Design shop of the 7 horsepower tractor.

1085681 Nan-ning (22 49N 108 19E) Rice Planter Manufacturing Plant. Rice planters awaiting shipment. 1964.

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EXPEDITE

CIA Photo Accession No.:

1104760	Shang-hai (31 14N 121 28E) Agricultural Machinery Plant. "Feng-shou" Model 35 tractor. 1965.
1150555	Large suspension-type pesticide sprayer successfully trial manufactured by the Agricultural Machinery Plant No. 1, Anhwei Province. Equipped with a 640 liter tank and 55 nozzles, this prayer can cover about 5 hectares in one hour. 1966.
1150556	Small rice paddy power harvester in use at Ta-wa Farm, Pan-chin Agricultural Reclamation Bureau, Liaoning Province. This harvester can reap 2 hectares of rice per day.
1150557	Kai-feng (34 47N 114 21E) Inspecting combines. 1966.
1150558	Pesticide sprayer attached to multiple-purpose plough being used to spray vegetables.

Enclosures: As Stated Above

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Running speed: 5 : 00 - 12 tires, motor gives 1500 rpm.

	Speed (km/h)			Speed (km/h)	
	With regular pulley	With fast pulley		With regular pulley	With fast pulley
Forward			V	4.56	8.85
I	1.28	2.48	VI	7.13	13.84
II	1.67	3.24	Backward		
III	2.01	3.90	I	1.60	3.10
IV	2.62	5.06	II	2.51	4.86

Revolutions per minute of rotating plough: motor gives 1500 rpm, with a low speed of 182 and a high speed of 273.

Gear operation: Speeds I and II, cultivation depth x cultivation breadth at highest range is 180 mm (usually 120-160 mm) x 614 mm.

Tactile power: On wetfields (iron wheels, paddy fields, at speeds III and IV) is 160-200 kg. On dry fields (rubber tires, wheat fields, at speeds III and IV), it is 180-200 kg. For road transport (rubber tires, automobile roads, at speed V), it is 260-290 kg.

Motor

Form: Model 195, horizontal, single cylinder, four-stroke Diesel engine.

Size (in millimeters, length x width x height): 935 x 600 x 590.

Cylinder diameter x strokes (in millimeters): 95 x 115.

Compression rate: 17.5.

Revolutions per minute (rpm): 1300-1500.

Related power: 6-7 PS.

Stipulated fuel consumption (g/PS/h): 200.

Stipulated lubricating oil consumption (g/PS/h): 5.

Weight (at dry state, in kg): 185 - 2 [illegible].

Starting method: By hand, with installation of pressure reduction.

Cooling method: Water boiling and steam sending method.

Lubricationg method: Pressure sending, blowing method, oiling.

Steam distribution: Intake valve opens at 5° before upper dead point, closes at 40° after lower dead point; exhaust valve opens at 40° before lower dead point and closes at 5° before upper dead point.

Between-valve gap (in millimeters, at cold state): Intake valves, 0.4 mm; exhaust valves, 0.5 mm.

Fuel pumps: single shift gear, oil pressure from 2 to 3.5 kg/cm^2; nozzle: multi-valve closing method, jet pressure of 160 kg/cm^2; speed regulator: centrifugal all through.

Power extracting method (Extracting from the motor crank axis edge): V-pulley of 236 mm for large wheels, two B-model pulleys of 142 mm for small wheels, three B-model pulleys with average diameter x width equal to [illegible] mm, with key accessory axis diameter of 40 mm.

Chassis

Clutch: Dry type, two-face, friction, ordinarily gear-engaging type, transmission box: cogwheel transmission, coupling type, breaks: band type installed on clutch axis, directing mechanism: right and left gear-engaging type clutches, oil valves: flexible xxx tube, collapsible type hand valves.

Running wheels: rubber xxxx tires (5 : 00 - 12, air pressure 2 kg/cm²) or iron wheels, cultivating rear wheels (rubber tires) of diameter x width (in millimeters): when close together 200 x 2[illegible], and when far apart [illegible] x 30, xxxx transport rear wheels 3 : 50 - 5 tires, air pressure 2.5 kg/cm², [illegible], balance xt weights 5kg for two, cultivation equipment: horizontal, 16 [illegible] type rotating plough, [illegible] model: [illegible] straight [illegible], straight [illegible] xtx attached, pointed [illegible] straight [illegible], and bending type, that is, four types altogether.

Fuel and Lubricating Oil Specifications

Fuel: number 20 or number 10 light Diesel oil (SYB 1071 - [illegible]).

Crankshaft xxx box lubricating oil: during the summer, number T14 machine oil (SYB 1152 - 60) and for the winter number T8 machine oil (SYB 1152 - 60).

Transmission system lubricating oil: for the summer use x car gear oil (SYB 1103 - 602), and for the winter car gear oil (SYB 1103 - 602).

Yellow oil nozzle lubricating oil: Coal soap base grease (SYB 1401 - 59).

The Many Uses of Kung-nung Model 7 Tractors

1. Cultivation purposes. Can plough to a depth of 12-16 cm generally (about 14 cm in the case of wetfields and dry fields and about 16 cm in the case of vegetable dry fields) when provided with rotating cultivation blades. If the soil is clayey and the water content low (7-8 %) or high (20 % or more), the depth is about 12 cm. The undulating rate of the cultivation depth usually comes to about 5-7 percent and depends mainly on the degree of ruggedness of the land surface, on the forward going speed of the tractor and on the rotating speed of the cultivation blades.

The tractor's soil-breaking capacity is usually high, the soil-breaking coefficient usually xxxx reaching about 70 percent, obtaining x even more than 90 percent in case the water content of the sandy soil is right, i.e. 15 percent. Since the soil gets fine broken up when cultivated with rotary ploughs, the soil gets puffed up to a level of 20-40 percent, xx which is xxxxxx very good for retaining water. The land surface and bottom are flat (the degree of ruggedness of the land surface of wetfields is about 10 percent, that of dry fields about 5 percent, that of vegetable fields about 3 percent and the submersion rate about 80 percent).

The proportion of land that does not get ploughed is extremely small: for a standard surface of 50 x 50 m^2 the proportion is 0.35 percent in the case of wetfield dry cultivation (rubber tires used). [illegible] Generally, should one attach across to 30 percent of the four-wheel tractors complementary ploughs, the rate of left uncultivated is 0.08 percent, or [illegible] eight times 1/1-150th of the land left unploughed should one use water buffaloes.

For one hour, one usually completes 1-1.5 mu, corresponding to the work of 3 draught animals or 25-30 man-days of work, and consuming 0.5 to 0.9 kg of fuel per mu.

2. Ploughing operations (when equipped with one L-1-20 model plough share, twin-direction plough). Cultivation depth of wetfields come to about 18 cm. Undulation rate about 5-10 percent, reversing at the beginning, good planting submersion (submersion rate about 70 percent), fine soil clods, the soil after initial cultivation grows puffed by about 30-40 percent, the degree of unevenness is about 10 percent, and the productivity about 0.8 mu per hour corresponding to the work of 1-2 head of draught animals, with one mu taking up 1.2-1.5 kg of fuel.

At the time of dry cultivation of the wet fields, since the soil water content is high (above 30 percent), the length of the soil clods reaches 50-60 cm, with the degree of unevenness of the land surface as high as 40 percent. Otherwise, it is the same as wet cultivation.

For initial cultivation of dry fields, the tractor also gives fine earth clods (40-60 percent), a rate of plant submersion above 80 percent, a cultivation productivity of 0.7-1 mu/h, one mu requiring 0.9 to 1.3 kg of fuel.

3. Raking operations. There are complex and single operations to be done at the same time as the cultivation. When there is need for intensive cultivation, these operations are performed at the time of the second cultivation, which the tractor can do to the same level as that done with water buffaloes. When it is a single operation, the degree of resistance is small and one can use a high speed. At speed V, the productivity is good while requiring but little fuel; yet the quality of the operation is fine: this, however, requires a high level of operating technique since a great power of concentration is demanded. Generally, it is proper to go at speed III for complex operations and speed IV for single operations. The productivity is [illegible] per hour, each mu requiring 0.15-0.2 kg of fuel.

4. Down pressing (With installation of 3YY-1 model pressing machine). In treading wheat plants during the spring in the North China dry fields, pressing down after sowing is enough to fulfill the requirements of agricultural techniques.

Should one use transport rear wheels, one can reduce the labor intensity while raising the speed of the operation. Productivity is 3-7 mu per hour, each mu requiring about 0.2 kg of fuel.

5. Ditch-digging (With installation of earth pounder and of dragging board type or adjustable type excavator). Works best with an adjustable type excavator, giving fine ditches and trapezoid mounds, giving sharp ditch walls with little crumbled earth, and by adjusting the machine one can dig ditches of about 19-25 cm in depth, 50-65 cm in breadth and 10-20 cm in bottom width. Productivity is 800-1000 meters per hour, each hour requiring 0.7-1.2 kg of fuel.

6. Water-pumping. By changing the V-pulley of the motor crankshaft into a plain pulley and by connecting to it a four-inch or six-inch pump, one can pump 50-90 tons of water per hour to irrigate 1-2 mu of land, each hour requiring 0.6-1.2 kg of fuel.

7. Midseason cultivation (With installation of mid-season cultivation machines). Works fine for early mid-season and single mid-season cultivation of sugar beets, Indian corn and kaoliang, is appropriate for various sowing operations while the rate of young plants that get hurt is low. 50-70 cm spacing out, depth of mid-season cultivation 4-6 cm, weeding rate 90 percent, and young plant hurting rate less than 0.1 percent. Productivity is 4-5 mu per hectare, one mu requiring 0.15 to 0.2 kg of fuel. For pounding, the rate of fuel consumption is somewhat higher, from 0.2 to 0.25 kg per hour.

8. Yam digging(With the use of [illegible]-type plough). By going at speed V, you dig one row each at each time, exposing from 25-80 percent of the yam with a loss rate relatively high at about 20 percent, productivity 2.5 to 3 mu per hour, each mu requiring 0.3-0.5 kg of fuel.

9. Threshing and other processing of agricultural by-products. Should one connect to the tractor a TT-4 corn husk remover and assign 25 laborers to it, one can reach a productivity of 4000-5000 kg per hour, one hour requiring 1.2-1.4 kg of fuel, grain removing rate of 98 percent and broken grain rate 5 percent. Besides, one can connect various other machines such as paddy and wheat threshers, cotton gins, rice polishers, and flour grinders, etc.

10. Transportation (Towing a 750 kg-capacity trailer). By changing the motor to a fast speed pulley, one can get around 12 km per hour at speed V or IV. 7-10 t/km/h, fuel consumption 0.13-0.18 kg/t/km.

Operation Costs of a Kung-nung 7 Tractor

Agricultural operations differ from locality to locality and since the economic conditions are not the same everywhere, as a whole

one cannot compare the costs of operations when done by men and animals on the one hand and by tractors on thex other. For instance, should one list out the cultivation operations, the xxxxxxxxxxx operation cost of a hand tractor for every mu in the region of Peking is 1.2-1.35 yuan while that done by animals comes to 1.[illegible] yuan, for Honan we have 1.55 yuan and 1.2-1.3 yuan respectively, and for the region of Shanghai 1.5 yuanx and 3.22 yuan respectively. However, the efficiency of a hand tractor is higher than that of domestic animals and its great functions can be promoted during the busy season. According to the accounted costs of the production xxxx brigades in the province of Szechuan, using the hand tractor, one can complete the transplanting from six to ten days earlier than if that was done by men and animals, thus representing an increase of 24-33 percent. xxxx Also, a production brigade in the region of Shanghai has been able to save about 3000 xxxxx man-days of work during the summer and autumn crops thanks to the use of the tractor. A production brigade in the region of Peking has used one hand tractor to do xxx the work of two draught animals, then used the two animals to carry fertilizers and others, thus being able to deduct more than ten yuan from the costs.

Easy Manipulation and Maintenance

Because the Kung-nung 7 hand tractor is simple in mechanism and therefore convenient for operation, the more knowledgeable youths at the countryside can learn to use it independently xxxxxxxxxxxx after about one month of training, then after manipulating it for about one or two operation seasons, they can do simple maintenance work and repair minor xxxxx xxxxx breakdowns. The motor is started manually and should the technical conditions be right, and the temperature below 5-10°C, it should start after two or three seconds. If the temperature drops below xxx 0°C, one should pour hot water on the machine and it should start after about [illegible] to 7 minutes. The operating force needed for various control xtr sticks is below 10 kg.

Maintenance is relatively easy, with one man spending about 30 minutes each time it should be enough. As for tools, there are eight kinds and 18 points to remember. Number [illegible] maintenance requires one man spending 1 hour and a half using 10 kinds of tools and checking 10 points, number [illegible] maintenance requires one man spending half a day using 20 tools and checking 26 points, and number 3 maintenance requires two men spending two days using 26 tools and checking 37 points. By testing from 1500 to 2000 hours, the xxxxxxxxxxxxxxxxxxxx maintenance coefficient is found to be about [illegible] percent.

Repair work is convenient, needing no jacking equipment and with the exception of crankshaft friction and inside [illegible] of cylinders all the repair work can be done on [illegible] [illegible] work can be done at some people's communes that have the conditions, thus saving time and money.

According to an assessment of the tests carried out in the last few years at various localities, the degree of reliability of the machines is about 90 percent. After 1000 hours of use, the motor still retains its stipulated generating power while fuel consumption rises to about 200 grams per hour per horse-power. After 2000 hours of use, the stipulated generating power drops by about 0.5 horsepower while fuel consumption rises to 250 grams per horsepower per hour. Now, the efficiency and anti-friction capacity of part of the parts have become good with another part getting better and better.

Several Remaining Problems

As far as the deficiencies of the Kung-nung 7 hand tractor are concerned, the cultivation depth is still does not go far enough, while the machine still does not break the earth fine enough, it is still hard to turn about. For this reason, they cannot be used for intensive cultivation, autumn cultivation and turning about during winter cultivation. As the machine is long, it is hard to change direction, dust and mud stick to it, and at dry cultivation of the paddy fields should the water content be high and the earth stick too much to the machine, various problems arise.

As for what should be improved upon in the future, it should have more accessory implements so that it can be used for all kind of agricultural operations. Besides, there is also the problem of the plough structure, of its hardness, of its strength, and of its manufacturing quality. The depth and width of the ploughing operations also are still unstable. The redemption and maintenance costs of the agricultural implements as well as of the tractor are said to come to 60 percent of the total operations costs, thus it is necessary to lower the cost of production of same, to raise their quality and to better the longevity of the parts. Thus it is necessary to stabilize and better the quality of the parts one step further, to improve upon their construction. For instance, there is still room for improvement in regard to the three valves of the motor (intake valve, exhaust valve, and loading valve of the fuel pump), the three filters (air filter, fuel filter, lubricating oil filter), the wheels for use in paddy fields, the cultivation rear wheels, and the gear clutch, etc. It is also necessary to better the protection against water in case of operations in paddy fields. The running wheels of the tractor do not cling fast, the draught efficiency is still low while the hauling power is weak: thus it is necessary to improve the whole running system, to rearrange it, to make it stay fast, to improve upon the use efficiency for weights as well as upon the hauling power.

At present, the new tractor is being manufactured everywhere according to the standard design charts, in Shanghai, Ch'angchou, Wuhan, Fukien, and Shenyang. In Shanghai and Ch'ang-chou, the combustion room

has been improved upon, the machine was powered up, various parts such as the fuel nozzle, the piston, the cylinder xxxxx cover, etc. bettered or x in the process of being experimented with. Also, in Shenyang the tractor has had its capacity stabilized for use on ridge-separated lands, and in order to make use of the connection of various agricultural implements, the structures of the chassis and of the connections have been improved upon. Thus, when the Kung-nung 7 nand tractor has x been improved upon and then mass produced, there is no doubt that because of xxxxxxxxxxxxx its extraordinary appropriateness to the intensive cultivation and local industries of China, it will be widely propagated to the people's communes everywhere.

Photos and Features of Chinese Industry, No. 41, 16 March 1966

AGRICULTURAL MACHINE INDUSTRY OF CHINA GIVEN SERIOUS CONSIDERATION

Communist China started on the long expected third 5-year plan this year, but judging from the editorial of the New Year's edition and from other issues of the Jen-min Jih-pao, it seems that the third 5-year plan will continue to follow the policy of "using industry as a guiding hand with agriculture as a base for people's economic development." In agricultural production growth, the "four-izations", namely, the water utilization, mechanization, chemicalization and the electrification and the "eight point charter" of soil improvement, greater use of fertilizers, development of water works, distribution of superior products, close planting, protection of plants, field management and improved implements have been cited and the objective is for greater harvest undeterred by natural calamities.

During the National Machine Products and Design Conference held in Peiping in December 1965, a decision to place an importance on mining and agricultural machines based on above policies was established. The following statement was issued.

"Basing on the task of the third 5-year plan and the technical situation in the present day China, the importance will be placed on revolutionary designs and production of mining and agricultural machines. From a strategic mission, a large amount of practical and highly efficient mining and agricultural machines must be designed as soon as possible." (NCNA, 21 Dec 1965)

A large development of agricultural machines is expected from this third 5-year plan. The trend toward development has become noticeable and the results of this improvement have been reported frequently since this year. The following is the trend seen in recent Chinese machine industry centered around tractors, towed farm equipment, agricultural products processing machines, irrigation and drainage machines, spraying machines, etc.

Rapid Progress in Mechanization

The mechanization of farms in China was placed on the agenda in early 1958 under the second 5-year plan. A greater emphasis was placed after the three successive years of natural calamity which began in 1959.

According to the New China News Agency report on 29 September 1965, the production of tractors gained five times over the production of 1957 (24,629 (15 hp) in 1957; therefore, 123,145 in 1965). The number of farm machines stations (or tractor stations) totaled 1400 and the large scale state operated farms totaled over 2,000. No national statistics on the mechanized cultivation is given but about 60% of the farms outside of Peiping, about 40% in Foshan Special District of Kwangtung Province and about 33% in Northeast Provinces have become mechanized.

The above NCNA report also stated that the total drainage and irrigation facilities increased thirteen times over 1957 or over 7,000,000

horsepowers. About 90% of the entire provinces now have pump stations. Kwangtung Province alone has spent 10,000,000 yuan (150,000,000,000 yen) in water works during 1958 to 1964. Over 70% of farm lands in Hang-chou--Chia-hsing-- Hu-cheu plains in Chekiang Province are equipped with either diesel or electric pumps. Furthermore, the amount of mechanical and electrical water drainage and irrigation facilities in Su-cheu Special District of Chekiang is said to be over 80% of the entire farmlands of China. The total capacity of drainage and irrigation pumps in farms outside of Peiping increased by 9.7 times that of 19[illegible]. During January to September 1965, 2,500 hydro turbine pumps were installed in farm villages throughout the country.

The number of small and medium size farm equipment reached one billion pieces in 1964 (NCNA, 27 Dec 1965).

The steel materials needed for the manufacture of farm machines in 1965 increased by 17% over 1964. Last manufacture of new steel products for agriculture increased by 21 items over 1964 (Chung-kuo Hsin-wen, 15 Feb 1966). The Ministry of Metallurgical Industry and the Ministry of Machine Building provided with 1,[illegible] tons of steel and scrape iron needed for the production of 1 billion pieces of small-medium size farm implements produced in 1965 (NCNA, 27 Dec 1965).

13 Types of Tractors

China was not able to produce any tractor prior to 1957; however, tractor plants, other than Wei Ho-yang Tractor Plant, were established in Shang-

hai, Shen-yang, An-shan, Man-ch'ang and Wu-han. These plants produce 13 types of tractors ranging from a small horsepower to a largest one of 100 horsepower. Five of these 13 types were newly produced in 1965 (NCNA 31 Jan 1966).

These known are the "Hung-ch'i 100", "Tung-fang-hung 75", "Tung-fang-hung 54", "Feng-shou 35", "Tung-fang-hung 28", "Yueh-chin 20" and the "Kung-nung 7" hand tractor. Beside these, 160 horsepower "Tung-fang-hung" bulldozer, 40 horsepower "Tung-fang-hung" land and water wheel tractor, "Kung-nung 5" hand tractor were test manufactured during 1965.

"Hung-ch'i 100"

This is a large type 100 horsepower tractor used for large scale land development and water works. It can be converted to bulldozer, power shovel, roller and crane for construction work.

"Tung-fang-hung 75"

This type manufactured by Lo-yang No. 1 Tractor Plant is a 75 horsepower tractor suitable for cultivation of dry farming districts in northeast and northern China. This tractor is basically a remodeled "Tung-fang-hung 54"; therefore, 90% of the parts are interchangeable. The model 75 is capable of cultivating 14 mou (1 mou = 1/15 ha) per hour, which is 35% greater than the area covered by the [illegible] It can be also used for ground leveling and for [illegible] uses and the most

of production are same as these of model 54 and the fuel consumption is about same.

"Tung-fang-hung 54"

This is a representative product of the Le-yang No.1 Tracter Plant. This is a caterpiller type producing 54 horsepower and is used mainly on farms. In 1965, Kwangtung Province used this model for rice fields by attaching water resisting and friction decreasing devices.

"Feng-shou 35"

This type is manufactured principally for rice fields. It has 35 horsepower and weighs only 1.5 ton. It has a very small turning radius, which is suited for narrow rice fields of 3 to 5 mou. It is capable of cultivating 5 mou per hour. It is easy to operate and can be used for spreading fertiliser and drainage work by attaching appropriate equipment. This type is produced in Shanghai.

"Tung-fang-hung 28"

This 28 horsepower wheel type was designed mainly for cotton and corn fields. It has a maximum speed of 25km per hour, which is suitable for cultivating, ground leveling, sowing, fertilizing and transporting.

"Yuehchin 20"

This is a small multi purpose 20 horsepower tractor. This can

be used in level fields but it is not suited for fields in narrow valleys and hills. It is capable of climbing an incline of 25 degrees. It can be used for sowing, weeding, harrowing, transporting and water pumping besides cultivating. It can cultivate 5 mou per hour. A mass production of this type started in 1965 at the Yun-ch'eng Tractor Plant in Shansi Province.

"Kung-nung 7" Hand Tractor

This 7 horsepower tractor is used specicfically in vegeatable, fruit and terrace farms. It can cultivate about 1.2 mou per hour and can be used for ditch digging, harrowing, weeding and for making levees. Engines can be used for producing electricity, threshing and for milling. This type was designed in Shanghai and is produced in Shanghai, Wu-han, Peiping and Shen-yang.

The Lo-yang No.1 Tractor Plant produced only the "Tung-fang-hung 54" until 1965 but has expanded into producing "Tung-fang-hung 75" tractor, generating units, distributing type oil pumps and hydraulic suspension system. At the same time, the plant also test produced 40 horsepower land and water wheel type tractor and 160 horsepower bulldozer.

In 1965, the plant mechanized the electric plating department which was formerly carried out manually. This mechanization increased the production by 6.5 times. The cost of production decreased each year. The cost per unit in 1964 was 1,000 yuan less than 1963 and the cost in 1965 was 1060 yuan less than 1964. The productivity of each worker increased by 7.6 times. The total production increased by 80% and the waste ratio

decreased by 11%.

Besides the plants mentioned above, Shih-chia-chuang Tractor Parts Plant, Wu-yang Nozzle and Oil Pump Plant, Nan-ch'ang Tractor Parts Plant, Pang-fou Tractor Parts Plant, Lu-k'ou Internal Combustion Engine Parts Plant, K'ai-feng Tractor and Electric Machine Plant are either built or being built for the greater development of tractor industry. Among the above plants, K'ai-feng Tractor and Electric Machine Plant started operating in August 1958. This plant produces 24 items including the direct current and alternating current electric generators, selsyn motors, motor regulaters for charging and induction coils. The Nan-ch'ang Tractor Parts Plant, which specializes in the production of tractor gears and forged parts for [illegible], started operating in December 1958. The size of these gears varies from 20mm to 447mm and comes in 10 different shapes from circular to cylindrical to bevel.

Superchargers to increase the efficiency of tractors were successfully test produced in October 1958 at Wu-hsing and are now being produced in small quantity. The attachment of this supercharger on the "Tung-fang-hung 54" tractor increases the horsepower to 60 - 65 and reduces the fuel consumption. A complete line of tools needed for repair works is now being produced.

Production and Development of Internal Combustion Engines for Farming

Internal combustion engines are necessary for mechanization of farms. The internal combustion engine industry of China has made a rapid progress.

At present, 50 - 300 horsepower diesel engines are being mass produced to meet the agricultural need. At the same time, larger engines of 400, 500 and even 1,000 horsepower are being manufactured.

In 1965, four types of 10 horsepower diesel and 5 types of gasoline engines were designed and manufactured.

The production technique level of Chinese diesel engine industry improved greatly. They are now manufacturing exhaust gas turbine, superchargers, hydraulic gear box, fuel injection pumps and air cool diesel engines (NCNA, 19 Feb 1966).

Approximately 140 different types of internal combustion engines and generating equipment are being used on Chinese farms today.

Over 100 Types of Agricultural Pumps

Over 100 types of agricultural use pumps were being produced in China during 1964 (Chun-kuo Hsin-wen, 27 Oct 1964).

Mixed flow pumps needed in areas of sufficient water supply are being produced. At present, 16 types have been test manufactured. A large pump with an opening of 50cm can pump 1,800 tons of water per hour or able to irrigate 280 ha per day. High head centrifugal pumps, hydraulic turbine and hydraulic ram using diesel engines and meters for terrace farms are now being produced. Recently, the propagation of hydraulic turbine and hydraulic ram pumps are being pushed. These pumps are able to pump up to about 10 meters from a lower level.

Because of the shortage of water resources in northern and north western China, water has to be taken from wells; therefore, 19 types pumps including the mechanical well pumps, old type well pumps, centrifugal rapid flow deep well pumps were test produced. In general, these pumps are capable of raising the water to about 30 meters from a well and pump about 25 tons per hour. A large pump is able to raise to about 150 tons per hour. A centrifugal type can pump a water from a well of over 50 meter deep. CHIKURYOKU KAKAN [phonetic] pumps used in Outer Mongolia are able to pump from wells of 70 - 100 meters deep.

[illegible] other pumps suitable in various areas are being produced in large quantity.

Furthermore, 29 different agricultural use pumps have been designed, test manufactured, tested and started producing in 1965. These pumps use 10KW motors or diesel engines. Out of these, 17 are portable types suitable for narrow rice fields in South China and 6 are suitable for irrigation from underground water in northern China.

Cultivating, Sowing, Harvesting, Processing Farm Equipment

The following is on cultivating, sowing, harvesting, processing equipment which have been successfully test produced and mass produced recently.

Cultivating :

In 1965, 11 share and 7 share tractor drawn plows were successfully

test produced in Liaoning Province. The 11 share plow can be used for making ridges, turning ground over and for sowing seeds besides the normal cultivating. This plow pulled by "Tung-fang-hung 54" tractor can cultivate 10 ha in 10 hours.

Rice Planter:

China started on the test manufacture of rice planters since 1956. After many improvements, the planter finally reached a practical stage. A specialised rice planter factory in Nan-ning of Kwangsi Chuang-tsu Self Autonomous Region began production of rice planters in November 1965. Planters produced in this plant is a claw type Kwangsi 65, which is an improved version of Kwangsi 59-3 model. It is possible to plant five rows at a time and is over twice as efficient as hand planting. The umber of seedlings, position and depth of planting can be regulated. Operating handles can be also adjusted according to operator's height. The dead weight of this machine is 25 kg; therefore, can be easily operated by one person.

Sower:

(1) Suspension type 48 rows fertilizer-planter

This machine was designed and built by the Harbin Agricultural Machine. A simultaneous fertilizing and planting operations can be carried out. It is possible to spread grainy, powdery or mixed

fertilisers.

(2) Soil turning and planting machine

This machine successfully test produced by the Anshan Kuang-hua Agricultural Machine Plant is capable of root removing, sowing and furrow covering in one operation.

(3) Furrow sowing

This machine successfully test produced by the Anshan Kuang-hua Agricultural Machine Plant is able to sow about 17 ha in 10 hours.

(4) Close corn sowing machine

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They have succeeded in test manufacture of 7 power sprayers and these are now in production. The following are some of them.

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Photos and Features of Chinese Industry, No. 64, 15 March 1966

AGRICULTURAL MACHINE INDUSTRY OF CHINA GIVEN SERIOUS CONSIDERATION

Communist China started on the long expected third 5-year plan from this year, but judging from the editorial of the New Year's edition and from other issues of the Jen-min Jih-pao, it seems that the third 5-year plan will continue to follow the policy of "using industry as a guiding hand with agriculture as a base for people's economic development." In the policy of agricultural production growth, the "four-izations", namely, the water utilization, mechanization, chemicalization and the electrification and the "eight point charter" of soil improvement, greater use of fertilizers, development of water works, distribution of superior products, close planting, protection of plants, field management and improved implements have been cited and the objective is for greater harvest undeterred by natural calamities.

During the National Machine Products and Design Conference held in Peiping in December 1965, a decision to place an importance on mining and agricultural machines based on above policies was established. The following statement was issued.

"Basing on the task of the third 5-year plan and the technical situation in the present day China, the importance will be placed on revolutionary designs and production of mining and agricultural machines. From a strategic mission, a large amount of practical and highly efficient mining and agricultural machines must be designed as soon as possible." (NCNA, 21 Dec 1965)

A large development of agricultural machines is expected from this third 5-year plan. The trend toward development has become noticeable and the results of this improvement have been reported frequently since this year. The following is the trend seen in recent Chinese machine industry centered around tractors, towed farm equipment, agricultural products processing machines, irrigation and drainage machines, spraying machines, etc.

Rapid Progress in Mechanization

The mechanization of farms in China was placed on the agenda in early 1958 under the second 5-year plan. A greater emphasis was placed after the three successive years of natural calamity which began in 1959.

According to the New China News Agency report on 29 September 1965, the production of tractors gained five times over the production of 1957 (24,629 (15 hp) in 1957; therefore, 123,145 in 1965). The number of farm machines stations (or tractor stations) totaled 1400 and the large scale state operated farms totaled over 2,000. No national statistics on the mechanized cultivation is given but about 60% of the farms outside of Peiping, about 40% in Foshan Special District of Kwangtung Province and about 33% in Northeast Provinces have become mechanized.

The above NCNA report also stated that the total drainage and irrigation facilities increased thirteen times over 1957 or over 7,000,000

horsepowers. About 90% of the entire provinces now have pump stations. Kwangtung Province alone has spent 10,000,000 yuan (150,000,000,000 yen) in water works during 1958 to 1964. Over 70% of farm lands in Hang-chou--Chia-hsing-- Hu-chou plains in Chekiang Province are equipped with either diesel or electric pumps. Furthermore, the amount of mechanical and electrical water drainage and irrigation facilities in Su-chou Special District of Chekiang is said to be over 80% of the entire farmlands of China. The total capacity of drainage and irrigation pumps in farms outside of Peiping increased by 9.7 times that of 1957. During January to September 1965, 2,500 hydro turbine pumps were installed in farm villages throughout the country.

The number of small and medium size farm equipment reached one billion pieces in 1965 (NCNA, 27 Dec 1965).

The steel materials needed for the manufacture of farm machines in 1965 increased by 27% over 1964. Test manufacture of new steel products for agriculture increased by 21 items over 1964 (Chung-kuo Hsin-wen, 15 Feb 1966). The Ministry of Metallurgical Industry and the Ministry of Machine Building provided with 1,000,000 tons of steel and scrape iron needed for the production of 1 billion pieces of small-medium size farm implements produced in 1965 (NCNA, 27 Dec 1965).

13 Types of Tractors

China was not able to produce any tractor prior to 1957; however, tractor plants, other than No.1 Lo-yang Tractor Plant, were established in Shang-

hai, Shen-yang, An-shan, Nan-ch'ang and Wu-han. These plants produce 13 types of tractors ranging from a small horsepower to a largest one of 100 horsepower. Five of these 13 types were newly produced in 1965 (NCNA 31 Jan 1966).

Those known are the "Hung-ch'i 100", "Tung-fang-hung 75", "Tung-fang-hung 54", "Feng-shou 35", "Tung-fang-hung 28", "Yueh-chin 20" and the "Kung-nung 7" hand tractor. Beside these, 160 horsepower "Tung-fang-hung" bulldozer, 40 horsepower "Tung-fang-hung" land and water wheel tractor, "Kung-nung 5" hand tractor were test manufactured during 1965.

"Hung-ch'i 100"

This is a large type 100 horsepower tractor used for large scale land development and water works. It can be converted to bulldozer, power shovel, roller and crane for construction work.

"Tung-fang-hung 75"

This type manufactured by Lo-yang No. 1 Tractor Plant is a 75 horsepower tractor suitable for cultivation of dry farming districts in northeast and northern China. This tractor is basically a remodeled "Tung-fang-hung 54"; therefore, 90% of the parts are interchangeable. The model 75 is capable of cultivating 14 mou (1 mou = 1/15 ha) per hour, which is 35% greater than the area covered by model 54. It can be also used for ground leveling and for sowing. The materials used and the cost

of production are same as those of model 54 and the fuel consumption is about same.

"Tung-fang-hung 54"

This is a representative product of the Lo-yang No.1 Tractor Plant. This is a caterpiller type producing 54 horsepower and is used mainly on farms. In 1965, Kwangtung Province used this model for rice fields by attaching water resisting and frictien decreasing devices.

"Feng-shou 35"

This type is manufactured principally for rice fields. It has 35 horsepower and weighs only 1.5 ton. It has a very small turning radius, which is suited for narrow rice fields of 3 to 5 mou. It is capable of cultivating 5 mou per hour. It is easy to operate and can be used for spreading fertilizer and drainage work by attaching appropriate equipment. This type is produced in Shanghai.

"Tung-fang-hung 28"

This 28 hprsepower wheel type was designed mainly for cotton and corn fields. It has a maximum speed of 25km per hour, which is suitable for cultivating, ground leveling, sowing, fertilizing and transporting.

"Yuehchin 20"

This is a small multi purpose 20 horsepower tractor. This can

be used in level fields but it is not suited for fields in narrow valleys and hills. It is capable of climbing an incline of 25 degrees. It can be used for sowing, weeding, harrowing, transporting and water pumping besides cultivating. It can cultivate 5 mou per hour. A mass production of this type started in 1965 at the Yun-ch'eng Tracter Plant in Shansi Province.

"Kung-nung 7" Hand Tractor

This 7 horsepower tractor is used specicfically in vegetable, fruit and terrace farms. It can cultivate about 1.2 mou per hour and can be used for ditch digging, harrowing, weeding and for making levees. Engines can be used for producing electricity, threshing and for milling. This type was designed in Shanghai and is produced in Shanghai, Wu-han, Peiping and Shen-yang.

The Lo-yang No.1 Tractor Plant produced only the "Tung-fang-hung 54" until 1965 but has expanded into producing "Tung-fang-hung 75" tractor, generating units, distributing type oil pumps and hydraulic suspension system. At the same time, the plant also test produced 40 horsepower land and water wheel type tractor and 160 horsepower bulldozer.

In 1965, the plant mechanized the electric plating department which was formerly carried out manually. This mechanization increased the production by 6.5 times. The cost of production decreased each year. The cost per unit in 1964 was 1,000 yuan less than 1963 and the cost in 1965 was 1060 yuan less than 1964. The productivity of each worker increased by 7.6 times. The total production increased by 80% and the waste ratio

decreased by 11%.

Besides the plants mentioned above, Shih-chia-chuang Tractor Parts Plant, Wu-yang Nozzle and Oil Pump Plant, Nan-ch'ang Tractor Parts Plant, Pang-fou Tractor Parts Plant, Lu-k'ou Internal Combustion Engine Parts Plant, K'ai-feng Tractor and Electric Machine Plant are either built or being built for the greater development of tractor industry. Among the above plants, K'ai-feng Tractor and Electric Machine Plant started operating in August 1965. This plant produces 20 items including the direct current and alternating current electric generators, selsyn motors, motor regulators for charging and induction coils. The Nan-ch'ang Tractor Parts Plant, which specializes in the production of tractor gears and forged parts for diesel engines, started operating in December 1965. The size of these gears varies from 20mm to 447mm and comes in 40 different shapes from circular to cylindrical to bevel.

Superchargers to increase the efficiency of tractors were successfully test produced in October 1965 at K'un-ming and are now being produced in small quantity. The attachment of this supercharger on the "Tung-fang-hung 54" tractor increases the horsepower to 60 - 65 and reduces the fuel consumption. A complete line of tools needed for repair works is now being produced.

Production and Development of Internal Combustion Engines for Farming

Internal combustion engines are necessary for mechanization of farms. The internal combustion engine industry of China has made a rapid progress.

At present, 50 - 300 horsepower diesel engines are being mass produced to meet the agricultural need. At the same time, larger engines of 400, 500 and even 1,000 horsepower are being manufactured.

In 1965, four types of 10 horsepower diesel and 5 types of gasoline engines were designed and manufactured.

The production technique level of Chinese diesel engine industry improved greatly. They are now manufacturing exhaust gas turbine, superchargers, hydraulic gear box, fuel injection pumps and air cool diesel engines (NCNA, 19 Feb 1966).

Approximately 140 different types of internal combustion engines and generating equipment are being used on Chinese farms today.

Over 100 Types of Agricultural Pumps

Over 100 types of agricultural use pumps were being produced in China during 1964 (Chun-kuo Hsin-wen, 27 Oct 1964).

Mixed flow pumps needed in areas of sufficient water supply are being produced. At present, 16 types have been test manufactured. A large pump with an opening of 50cm can pump 1,800 tons of water per hour or able to irrigate 280 ha per day. High head centrifugal pumps, hydraulic turbine and hydraulic ram using diesel engines and meters for terrace farms are now being produced. Recently, the propagation of hydraulic turbine and hydraulic ram pumps are being pushed. These pumps are able to pump up to about 10 meters from a lower level.

Because of the shortage of water resources in northern and north western China, water has to be taken from wells; therefore, 19 types of pumps including the mechanical well pumps, old type well pumps, centrifugal rapid flow deep well pumps were test produced. In general, these pumps are capable of raising the water to about 30 meters from a well and pump about 25 tons per hour. A large pump is able to raise to about 150 tons per hour. A centrifugal type can pump a water from a well of over 50 meter deep. CHIKURYOKU RAKAN [phonetic] pumps used in Outer Mongolia are able to pump from wells of 70 - 100 meters deep.

In addition, other pumps suitable in various areas are being produced in large quantity.

Furthermore, 29 different agricultural use pumps have been designed, test manufactured, tested and started producing in 1965. These pumps use 10KW motors or diesel engines. Out of these, 17 are portable types suitable for narrow rice fields in South China and 6 are suitable for irrigation from underground water in northern China.

Cultivating, Sowing, Harvesting, Processing Farm Equipment

The following is on cultivating, sowing, harvesting, processing equipment which have been successfully test produced and mass produced recently.

Cultivating :

In 1965, 11 share and 7 share tractor drawn plows were successfully

test produced in Liaoning Province. The 11 share plow can be used for making ridges, turning ground over and for sowing seeds besides the normal cultivating. This plow pulled by "Tung-fang-hung 54" tractor can cultivate 10 ha in 10 hours.

Rice Planter:

China started on the test manufacture of rice planters since 1956. After many improvements, the planter finally reached a practical stage. A specialized rice planter factory in Nan-ning of Kwangsi Chuang-tsu Self Autonomous Region began production of rice planters in November 1965. Planters produced in this plant is a claw type Kwangsi 65, which is an improved version of Kwangsi 59-3 model. It is possible to plant five rows at a time and is over twice as efficient as hand planting. The umber of seedlings, position and depth of planting can be regulated. Operating handles can be also adjusted according to operator's height. The dead weight of this machine is 25 kg; therefore, can be easily operated by one person.

Sower:

(1) Suspension type 48 rows fertilizer-planter

This machine was designed and built by the Harbin Agricultural Machine. A simultaneous fertilizing and planting operations can be carried out. It is possible to spread grainy, powdery or mixed

fertilizers.

(2) Soil turning and planting machine

This machine successfully test produced by the Anshan Kuang-hua Agricultural Machine Plant is capable of root removing, sowing and furrow covering in one operation.

(3) Furrow sowing

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